

Calorimetry

The molar heat capacity of a compound with the formula C_2H_6SO is $88.0 \text{ J/mol}\cdot\text{K}$. What is the specific heat of this substance ?

A sample of aluminum metal absorbs 9.86 J of heat, upon which the temperature of the sample increases from 23.2°C to 30.5°C . Since the specific heat capacity of aluminum is $0.90 \text{ J/g}\cdot\text{K}$, what is the mass of the sample?

The specific heat of liquid bromine is $0.226 \text{ J/g}\cdot\text{K}$. How much heat (J) is required to raise the temperature of 10.0 mL of bromine from 25.00°C to 27.30°C ? The density of liquid bromine: 3.12 g/mL .

The ΔH for the solution process when solid sodium hydroxide dissolves in water is -44.4 kJ/mol . When a 13.9-g sample of NaOH dissolves in 250.0 g of water in a coffee-cup calorimeter, the temperature increases from 23.0°C to _____ $^\circ\text{C}$. Assume that the solution has the same specific heat as liquid water.

When 3.88 g sample of solid ammonium nitrate dissolves in 60.0 g of water in a coffee-cup calorimeter, the temperature drops from 23.0°C to 18.4°C . Calculate the ΔH (in kJ/mol NH_4NO_3).

The British thermal unit (BTU) is commonly used in engineering applications. A BTU is defined as the amount of heat required to raise the temperature of 1.00 lb of water by 1.00°F. How many joules are in one BTU?

A 1.800 g sample of phenol ($\text{C}_6\text{H}_5\text{OH}$) was burned in a bomb calorimeter whose total heat capacity is 11.66 kJ/°C. The temperature of the calorimeter increases from 23.44°C to 30.57°C. Write a balanced chemical equation for the bomb calorimeter reaction. What is the heat of combustion per gram of phenol? Per mole of phenol?

A 50.0-g sample of liquid water at 25.0°C is mixed with 29.0 g of water at 45.0°C. What is the final temperature of the water?

Under constant-volume conditions the heat of combustion of benzoic acid ($\text{HC}_7\text{H}_5\text{O}_2$) is -26.38 kJ/g. A 1.540 g sample of benzoic acid is burned in a bomb calorimeter. The temperature of the calorimeter increases from 22.25°C to 27.20°C.

- (a) What is the total heat capacity of the calorimeter?
- (b) A 1.320 g sample of a new organic substance is combusted in the same calorimeter. The temperature of the calorimeter increases from 22.14°C to 26.82°C. What is the heat of combustion per gram of the new substance?
- (c) Suppose that in changing samples, a portion of the water in the calorimeter was lost. In what way, if any, would this change the heat capacity of the calorimeter?